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Adamson

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[54] **LIQUID DISPENSING WITH DUAL RESERVOIR DELIVERY SYSTEM**

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[51] **Int. Cl.**[6] **B67D 5/56**

[52] **U.S. Cl.** **222/129;** 222/153.03; 222/181; 222/383.1

[58] **Field of Search** 222/129, 153, 181, 383

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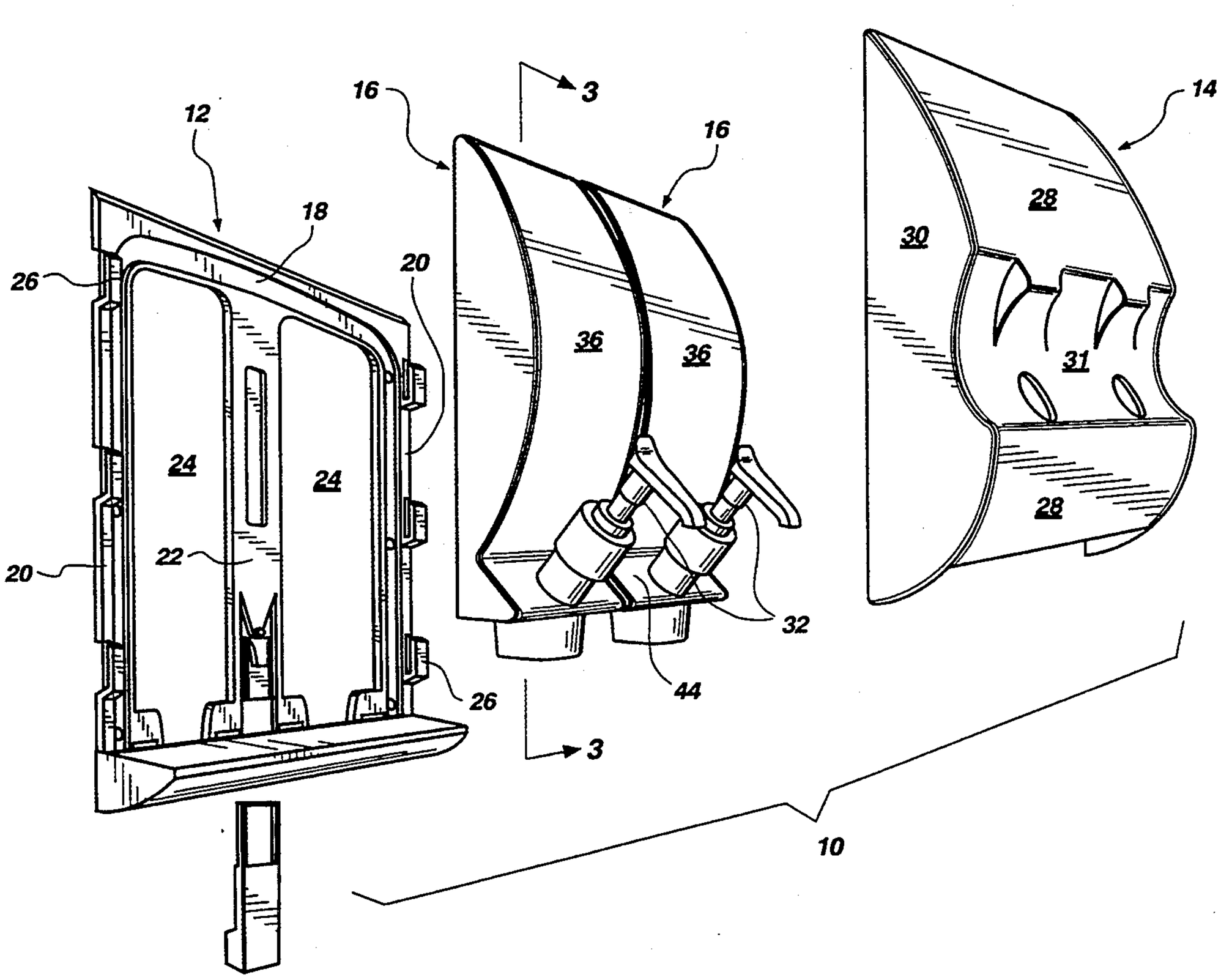
[57] **ABSTRACT**

A liquid dispensing device incorporates a housing for mounting on a shower, bath enclosure, or other appropriate wall. The housing houses a plurality of refillable and sealable bottles that conform to the interior contour of the housing in order to maintain a narrow and streamlined profile to the housing. Each of the bottles comprises a supply reservoir, a dispensing reservoir, a transition area connecting the two reservoirs, and a dispensing pump mechanism that dispenses a measured amount of fluid from the dispensing reservoir. The pump injects an amount of ambient pressure air into the closed bottle equal to the amount of liquid dispensed, with each dispensing cycle, to equalize and maintain the pressures inside and outside the bottle to prevent collapse of the bottle as liquid is withdrawn. This equalization of pressure prevents liquid from inadvertently seeping through the pump under its own weight.

8 Claims, 4 Drawing Sheets



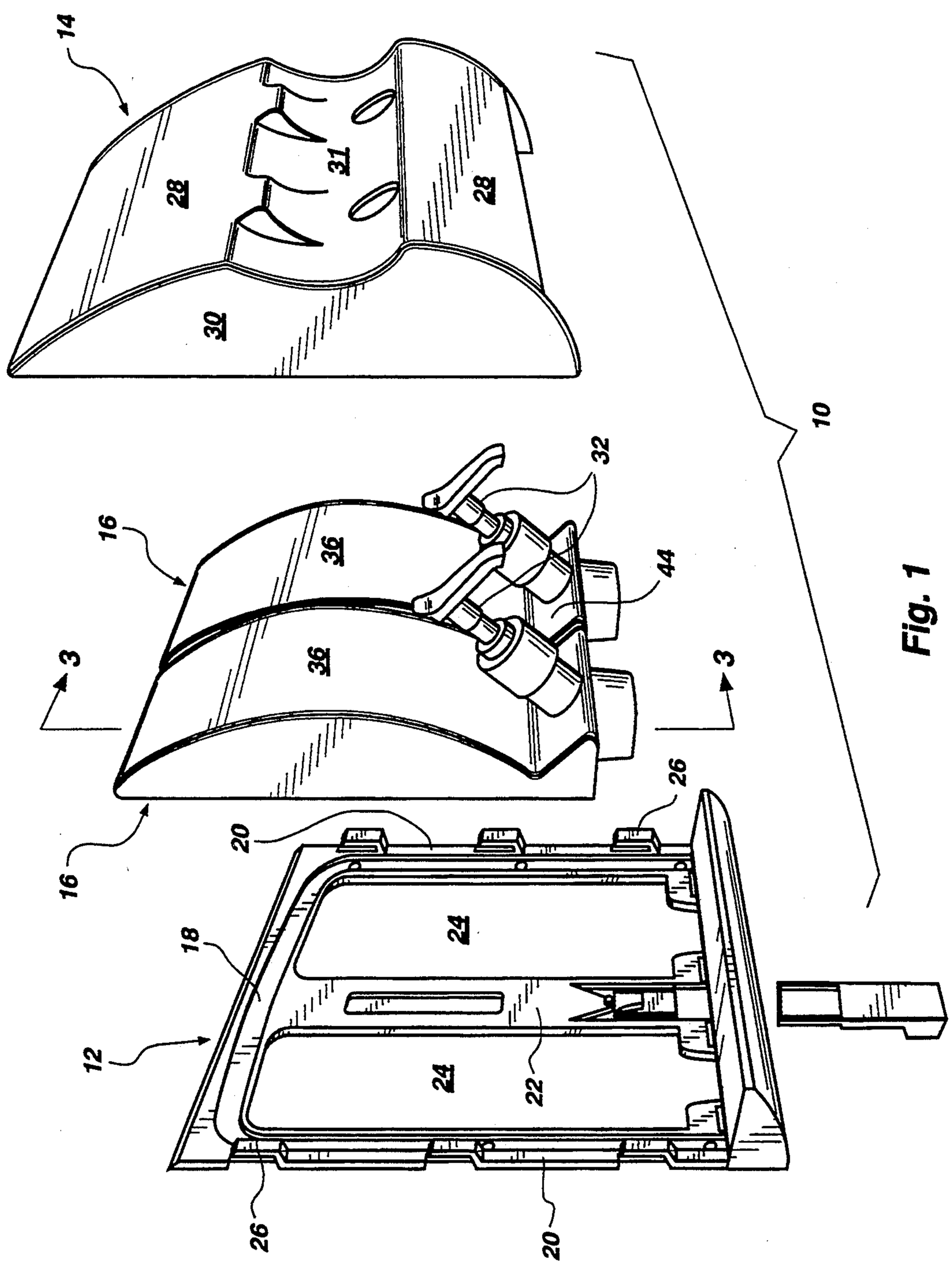


Fig. 1

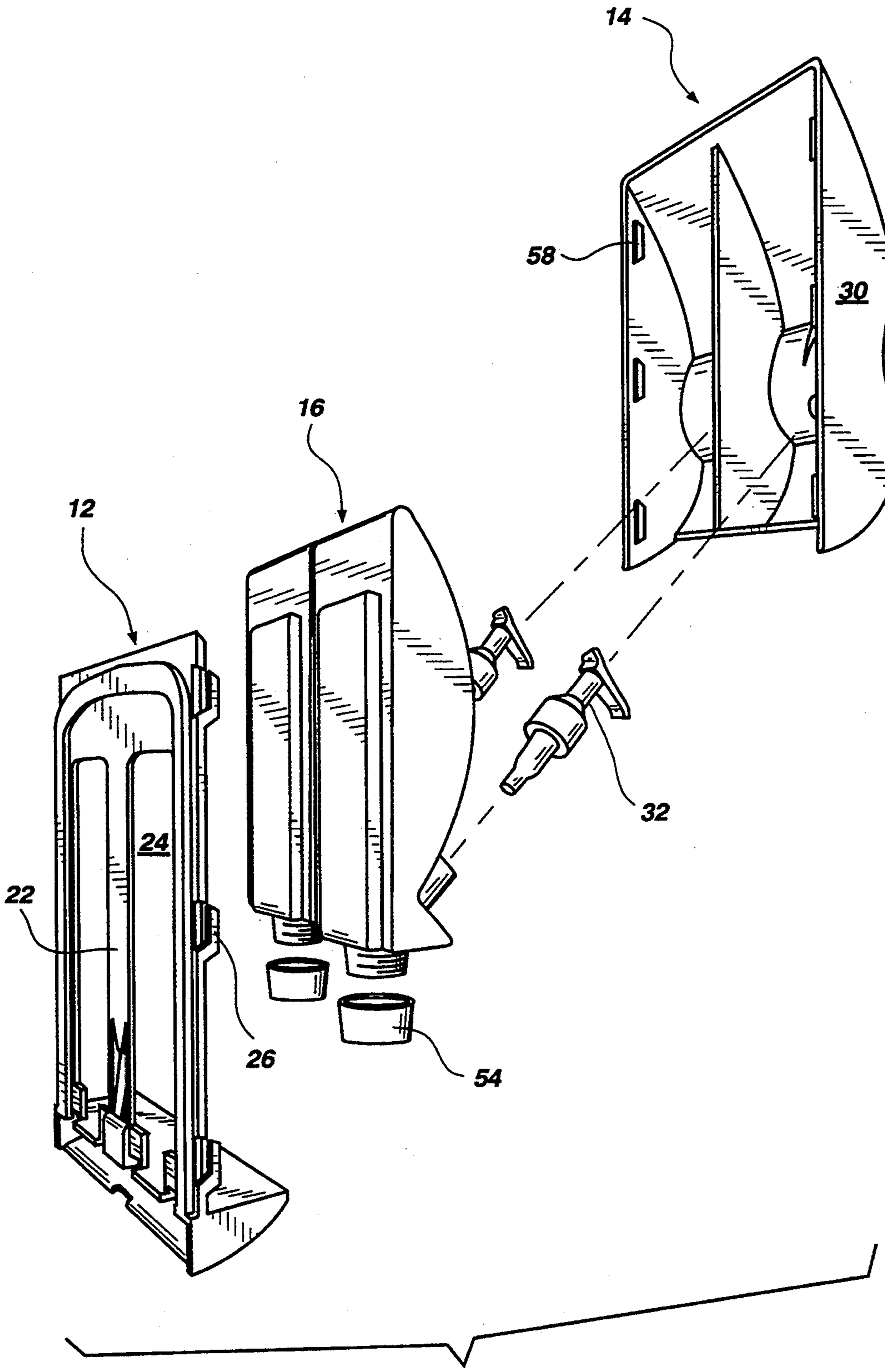


Fig. 2

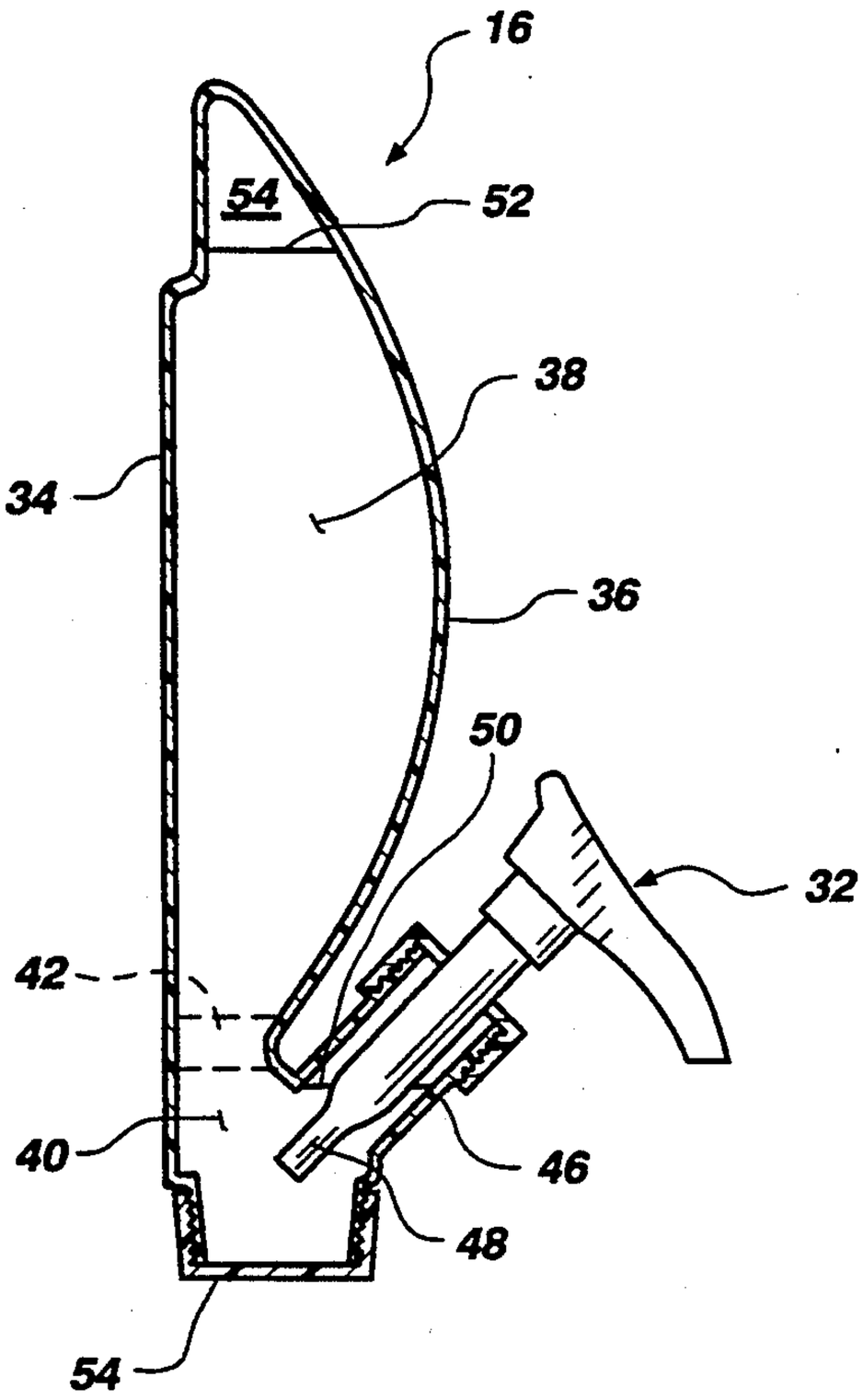


Fig. 3

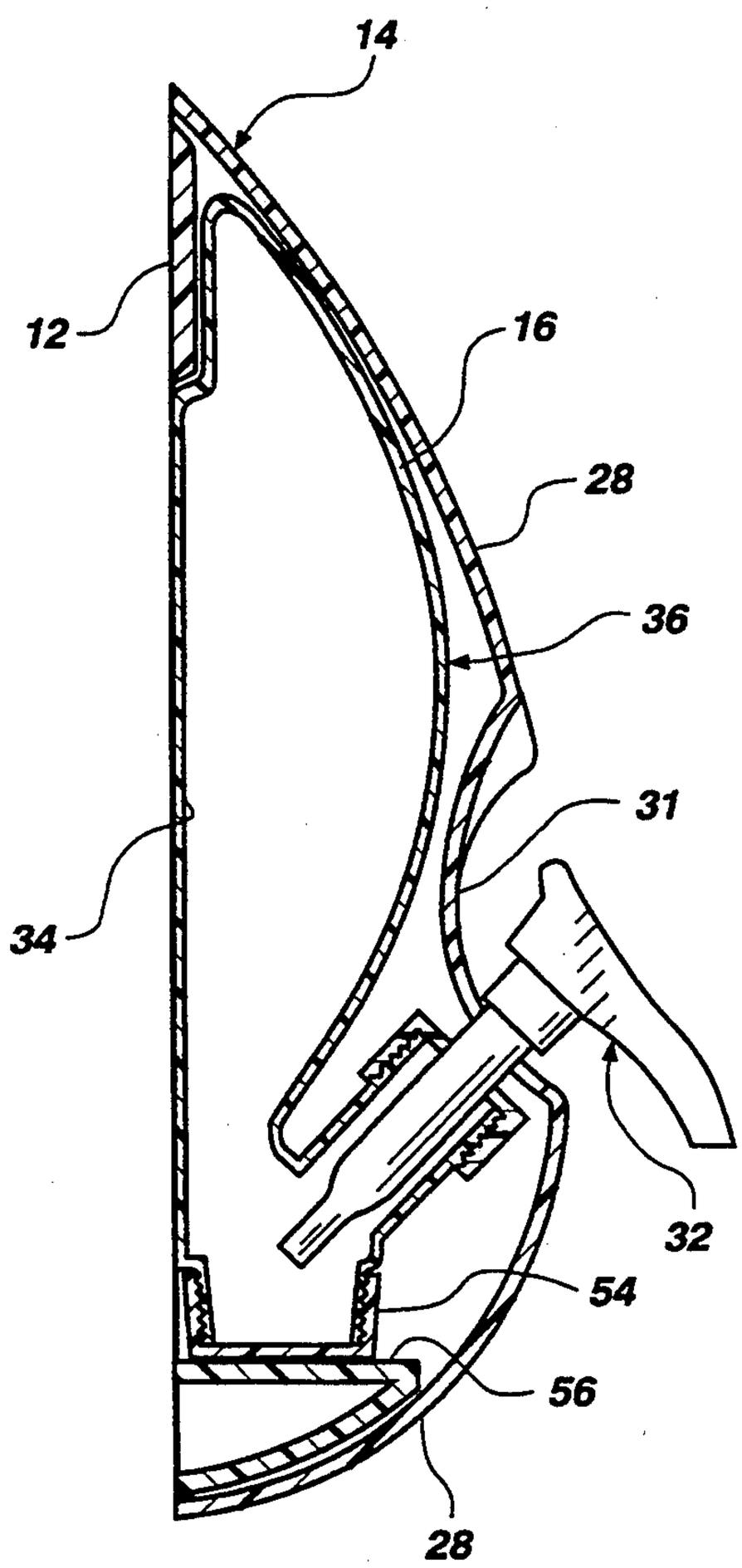


Fig. 4

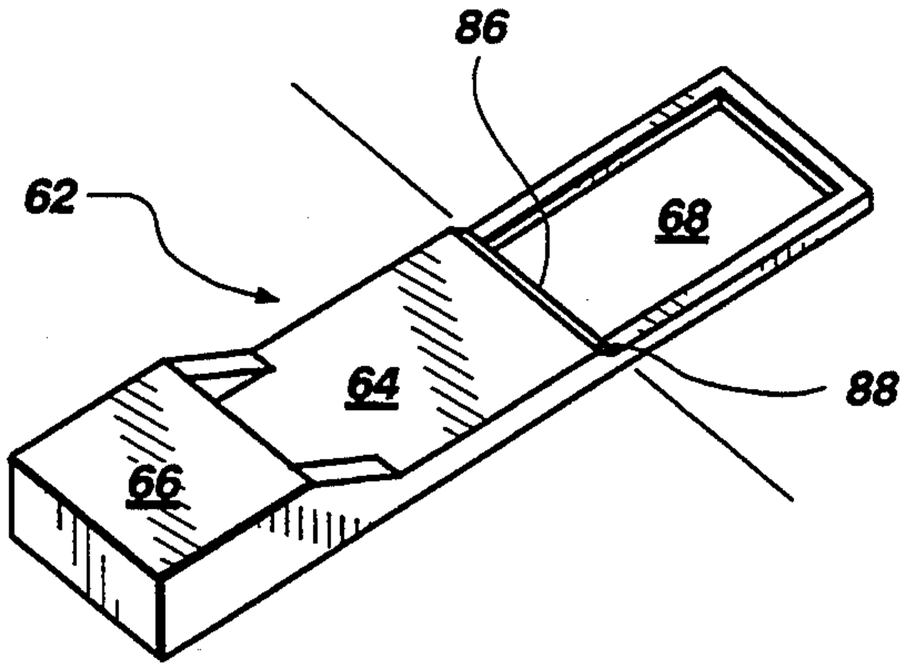


Fig. 5

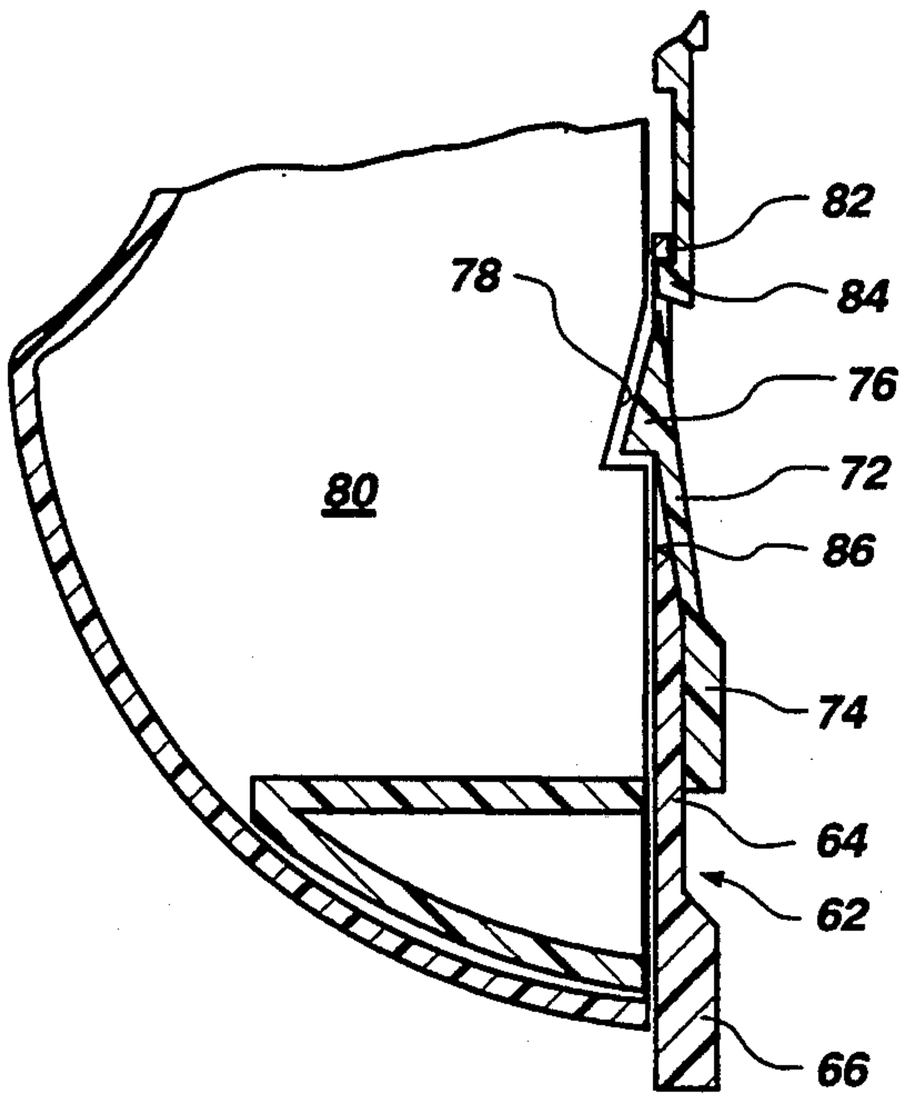


Fig. 6A

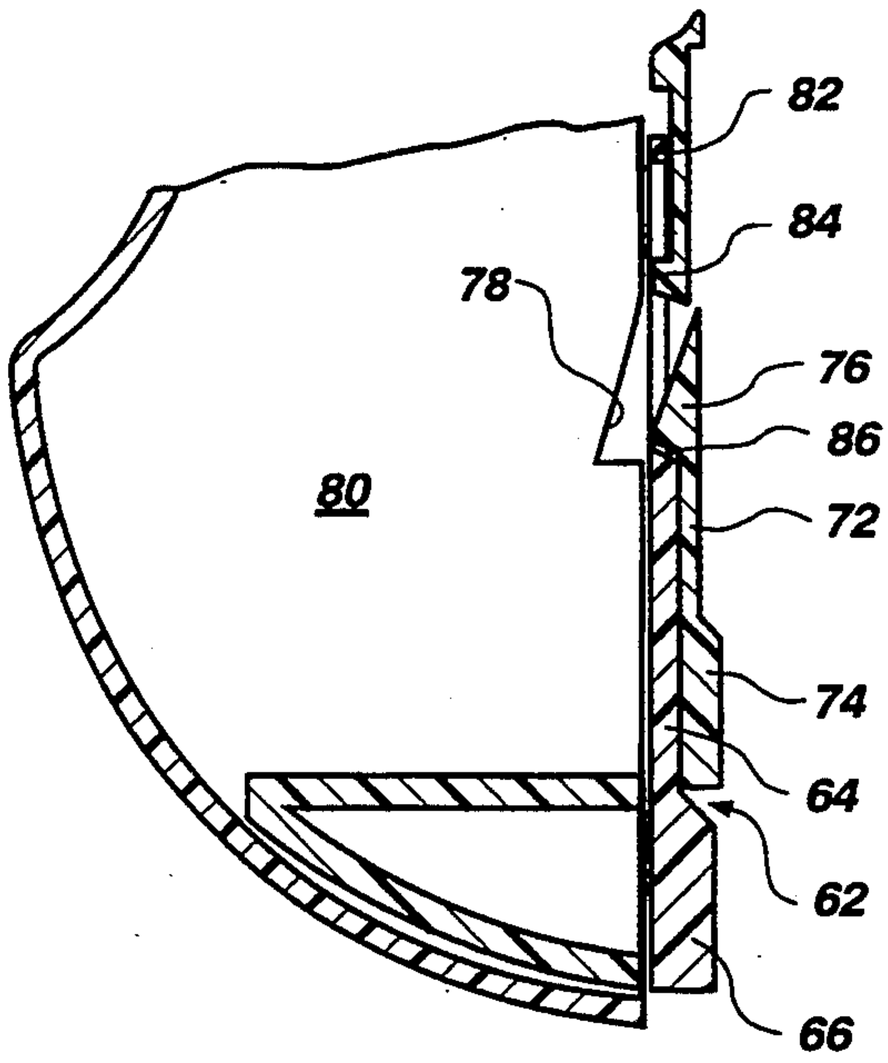


Fig. 6B

LIQUID DISPENSING WITH DUAL RESERVOIR DELIVERY SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to liquid dispensers, and more particularly relates to a wall-mountable dispenser having removable and reusable (refillable) liquid dispensing bottles therein.

2. Description of Related Art

To shower or bathe, it is convenient to have close at hand a liquid dispenser for soap, shampoo, conditioner, hand lotion, etc. for use in the shower or bath. A number of devices presently exist for installing in the shower or bath, either on the wall or suspended from the shower head, for holding and dispensing these personal hygiene items. Some of these devices include a plurality of gravity flow reservoirs that incorporate dispensing valve mechanisms at the bottom thereof, in addition to a rack for holding shower, bath, and other personal hygiene items, as in bar soap, shaver, etc. One related prior art device incorporates a mirror, illuminating light, radio, and a number of replaceable liquid dispensers. Other devices incorporate box assemblies for holding a plurality of liquid containers, each having a top-mounted pump mechanism that withdraws liquid from the bottom of the container, as in many conventional dispenser bottles. In addition, one prior art device utilizes gas pressure from an enclosed pressurized tank for forcing liquid out of the container, and for preventing the container from drawing air back therein due to atmospheric pressure.

SUMMARY OF THE INVENTION

The present invention is directed to a liquid dispensing device for mounting on a wall, the device incorporating a plurality of refillable and sealable bottles that conform to the shape of the wall-mounted back plate and detachable front cover. Each of the bottles includes a dual reservoir delivery system which comprises a first supply reservoir, and a second dispensing reservoir into which the liquid gravity flows from the supply reservoir. A pump mechanism communicates with the dispensing reservoir for withdrawing the liquid therefrom. The pump mechanism injects a volume of air at ambient pressure equal to the volume of liquid withdrawn from the second reservoir. This volume of air then makes its way upwardly into the supply reservoir for equalizing the pressure therein, and permitting a like volume of liquid to flow from the supply reservoir into the dispensing reservoir.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective exploded front view of the components of the liquid dispensing device of the present invention.

FIG. **2** is a perspective exploded rear view of the components of the liquid dispensing device.

FIG. **3** is a vertical sectional view taken along lines **3—3** in FIG. **1**, showing the interior relationship of the two reservoirs and pump mechanism of the liquid bottle.

FIG. **4** is a vertical sectional view through the assembled back plate, bottle, and cover of the liquid dispensing device.

FIG. **5** is a perspective view of the locking mechanism key.

FIG. **6A** is a partial, vertical sectional view through the back plate, front cover, and locking key illustrating the locking mechanism, with the key in its down, "locked" position.

FIG. **6B** is a partial, vertical sectional view through the back plate, front cover, and locking key illustrating the locking mechanism, with the key in its up, "unlocked" position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the drawings, and initially to FIG. **1**, the liquid dispensing device of the present invention is shown in exploded perspective, generally illustrated by the numeral 10. The dispensing device comprises three major elements: (1) a rectangular back plate **12**; (2) a front cover **14** adapted for quick attachment to and removal from the back plate; and (3) at least one, and preferably a plurality of, refillable, sealable bottles **16**, configured to confirm to the interior contours of the back plate and the front cover.

The back plate **12** is adapated for screw- or adhesive-mounting to a vertical wall in a customary manner. The back plate **12** is commercially fabricated of plastic, and comprises a generally planar section **18**, having two vertical and parallel edge structural braces **20** that cooperate with a central brace **22** to define two essentially rectangular openings or voids **24** that receive therein rearwardly expanded sections of respective bottles **16**, as are better illustrated in FIGS. **2**, **3**, and **4**, and will be described in more detail hereinbelow. In the embodiment shown, the liquid dispensing device includes two sealable bottles **16**; therefore, the planar section **18** of the back plate includes two corresponding openings **24**.

The planar section **18** of the back plate includes a plurality of hooks **26** on the two structural edges **20** thereof to enable the front cover **14** to be functionally attached thereto by positioning the front cover directly over, and slightly above, the back plate, thereafter sliding the front cover downward to enable mating tabs (not clearly shown in FIG. **1**) on the front cover to catch on the hooks to retain the front cover in position.

The front cover **14** incorporates an aesthetically pleasing outwardly curved front surface **28** that is connected to essentially straight and vertical side panels **30** to define the outer contours of the cover. The curved front surface **28** also includes an intermediate inwardly curved surface **31** that defines a recessed portion of the front cover, and having holes through which the pump mechanisms **32** of the respective bottles **16** extend for access thereto.

As best shown in FIGS. **2** and **4**, the refillable and sealable bottles **16** conform to the contours of both the back plate **12** and the front cover **14**. Each of the bottles **16** includes the rearwardly portruding section **34** that is adapted to fit into a respective opening **24** in the back plate **12**. This design aids in maximizing the available interior volume of the bottle **16**, while simultaneously permitting the front cover **14** to maintain a slim profile. The bottle front surface **36** likewise is designed to conform to the interior contour of the cover outwardly curved front surface **28**, again to aid in maximizing the usable volume of the bottle, while enabling the liquid dispensing device to maintain a narrow profile.

Turning specifically to FIG. **3**, a bottle **16** is shown in vertical section taken through the pump mechanism **32**.

The bottle comprises two fluid reservoirs, a first or supply reservoir **38** and a second or dispensing reservoir **40**. These reservoirs **38** and **40** are separated by transition area **42**, defined by a narrowing of the transition from the bottle front contoured surface **36** to a lower angled surface **44** (best shown in FIG. **1**) to which the pump mechanism **32** is indirectly mounted.

The lower angled surface **44** of the bottle includes a nozzle **46** to which the pump mechanism **32** is attached in a customary manner. The nozzle **46** is essentially normal to the angled surface **44**, and is oriented at an angle to permit convenient use thereof by the user. The pump mechanism **32** is a conventional, commercially-available unit that expels liquid on the down or compression stroke, and subsequently draws liquid into the pump chamber thereof on the spring-actuated up stroke. As is customary, the pump mechanism **32** includes a suction tube **48** that extends down into the lowermost portion of the dispensing reservoir **40** to enable the pump mechanism to draw liquid therefrom.

This pump mechanism **32** is of a type that "breathes"; that is, during the up stroke in which liquid is drawn up into the pump chamber through the suction tube, an equivalent volume of air is introduced into the dispensing reservoir through the pump mechanism in order to equalize pressure inside and outside of the bottle, and prevent collapse of the bottle as liquid is dispensed therefrom during use. This air introduced into the bottle through the pump mechanism, of course, accumulates above the level **50** of the liquid within the dispensing reservoir **40**.

The dispensing reservoir and supply reservoir are so designed such that, when the liquid level **50** in the dispensing reservoir (because of the introduction of air through the pump mechanism) drops down to the lower-most point in the reservoir transition area **42**, an air bubble is permitted to "burp" around the sharply curved portion of the reservoir transition area from the dispensing reservoir to the supply reservoir. This "burping" air bubble equalizes the pressure within the supply reservoir, then makes its way to the top of the reservoir, above the liquid level **52** in the supply reservoir to permit fluid in the supply reservoir to drop down under gravity-feed, through the reservoir transition area **42** and into the dispensing reservoir **40**. In this manner, the pressure within the bottle is constantly maintained at approximately atmospheric pressure, without collapsing the bottle, while utilizing the vacuum effect in the area **54** above the liquid level in the supply reservoir to prevent the liquid in the bottle from flowing through and out the pump mechanism **32** under its own weight.

FIG. **4** is a vertical sectional view taken through the assembled liquid dispensing device, illustrating how the bottles fit within the front cover and back plate, with the pump mechanisms extending through the recessed portion **31** of the outwardly curved front surface **28** of the front cover. The bottles rest upside down, i.e., with the neck and cap **54** at the bottom resting on the vertical ledge **56** of the back plate, with the rearwardly portruding section **34** of the bottle nesting within the opening **24** of the back plate.

The liquid dispensing device of the present invention is assembled in the following procedure. With the pump mechanisms **32** in place upon the bottle nozzles **46**, the user pours chosen liquids (shampoo, conditioner, liquid soap, hand lotion, etc.) into the bottle and tightly replaces the caps. He next positions the bottles within the front cover, making sure that the pump mechanisms portrude through the pump mechanism openings in the recessed portion **31**. So positioned, the bottles will remain in the front cover as the front cover is installed on the back plate.

To install the cover on the back plate, the user positions the cover, with the bottles inside, directly against, and slightly above (as shown in the drawings) the back plate. He slides the cover down until the hooks **26** on the back plate engage mating tabs **58** on the front cover, and then further pushes the front cover down until the bottle cap rests on the horizontal ledge of the back plate, at which time a spring-operated locking mechanism locks the front cover to the back plate. This locking mechanism is shown more clearly in FIGS. **5**, **6**A, and **6**B.

As the front cover is slid into position on the back plate, the rearwardly portruding section **34** of the bottle shifts into its receiving area defined by the opening **24** in the back plate. In addition to increasing the fluid volume of the bottle, this rearwardly portruding section **34** rests directly against the surface of the wall to which the liquid dispensing device is mounted, thereby providing a positive engagement with a solid surface to provide support and resistance to the force applied by the user in pressing down and toward the wall on the pump mechanism to dispense a measured volume of liquid.

FIGS. **5**, **6**A, and **6**B illustrate the locking mechanism for the front cover and back plate of the liquid dispensing device. FIG. **5** is a perspective view of a key **62** used to unlock the front cower from the back plate. As shown, the key **62** comprises a generally planar section **64** having a griping portion **66** at one end and a rectangular through hole **68** at the other end. The key **62** is essentially rectangular in cross-section and is adapted to slide axially in a rectangular channel formed in the back plate **12**.

FIGS. **6**A and **6**B are vertical sectional views through the locking interface of the back plate **12** and the front cover **14**. The locking mechanism comprises a resiliant finger **72** attached to the bottom panel **74** of the back plate **12** at the lower end thereof, the resiliant finger having a triangular shaped latch **76** formed at the top thereof. The finger **72** and latch **76** are biased in the direction away from the wall and toward the front portion of the front cover **14**, to the left as shown in FIGS. **6**A and **6**B.

When the front cover is locked into position, as shown in FIG. **6**A, the triangular shaped latch **76** engages a mating detent **78** formed in the center dividing wall **80** of the front cover in a manner to prevent the front cover from being shifted upwardly to detach the cover from the back plate.

As shown in FIGS. **6**A and **6**B, the key **62** is vertically slidable in its rectangular channel, between a "locking" position, as shown in FIG. **6**A, and an "unlocking" position, as shown in FIG. **6**B, when the key is pushed upwardly against the locking mechanism finger and latch.

When the front cover **14** is in functional position relative to the back plate **12**, the detent **78** in the front cover dividing wall **80** and the finger latch **76** of the back plate (both when "locked" and "unlocked") are positioned within the rectangular through hole **68** of the key. As shown in FIG. **6**A, a top portion **82** of the key above the through hole **60** rests on a projecting tab **84** which projects toward the front of the front cover from the center brace **22** of the frame of the back plate to

retain the key within its rectangular channel and prevent it from falling out. It can be appreciated, therefore, that the finger latch and detent mechanism function within the through hole of the key.

The key through hole defines a bottom surface **86** that is designed to engage the locking mechanism finger **72** and urge it rearwardly away from the front cover as the key is shifted upwardly to its "unlock" position as shown in FIG. **6**B. As can be appreciated, as the key slides upwardly, the through hole bottom surface **86** engages the finger and urges it rearwardly (to the right in FIG. **6**B) to retract the latch **76** from the detent **78**. With the latch retracted from the detent, the front cover and fluid dispensing bottles therein may be shifted upwardly to release the cover from the back plate hooks **26**, and then be totally removed for refilling of the bottles. The key can now be shifted downwardly to its "locked" position, freeing up the finger and latch mechanism to be biased into the detent when the top cover **14** is subsequently reinstalled on the back plate. As can be appreciated, when the cover is slid down into position on the back plate, the latch is biased into the detent to "lock" the cover in place until it is desired to unlock and remove the cover using the key.

There are instances wherein it is desirable to have more control over the removal of the top cover from the back plate. Specifically, in commercial applications, it is desirable to prevent the cover from being removed without authorization. Therefore, the key **62** is designed to be removed from the device, if desired, thereby preventing unauthorized removal of the front cover. In order to remove the key, breaklines **88** have been provided adjacent the through hole bottom surface **86** that engages the locking mechanism finger, to enable the top portion of the key (the "U" defining the through hole) to be readily broken off and discarded. A key thus modified can easily be inserted into the rectangular channel and urged upwardly to engage the locking mechanism finger, pushing it rearwardly (to the right as shown in FIGS. **6**A and **6**B) to release the latch from the detent, as previously described. The difference, however, is that, without the top portion **82** of the key being retained by the tab **84**, the key can be removed once the front cover is "unlocked" from the back plate and shifted upwardly slightly so that the detent **78** clears the triangular shaped latch **76**. In this manner, the liquid dispensing device of the present invention can be used in commercial applications in which it is desired to limit access to the refillable bottles inside.

From the foregoing, it will be seen that this invention is one well adapted to attain all of the ends and objectives herein set forth, together with other advantages which are obvious and which are inherent to the apparatus. It will be understood that certain features and subcombinations are of utility and may be employed with reference to other features and subcombinations. This is contemplated by and is within the scope of the claims. As many possible embodiments may be made of the invention without departing from the scope of the claims. It is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A liquid dispensing device for wall mounting, comprising:

(a) a substantially rectangular back plate for mounting on a wall;

(b) a cover adapted for quick attachment to and removal from said back plate; and

(c) a refillable, bottle adapted to conform to the interior contours of said back plate and said cover, and mountable in functional position within said cover, said bottle being sealed at all times except when dispensing liquid therefrom, said bottle comprising:

(1) a first reservoir for holding a supply of liquid therein; and

(2) a second reservoir positioned vertically below and in communication with said first reservoir for vacuum-pressure-controlled gravity-feed of liquid from said first reservoir to said second reservoir, said second reservoir including a pump for withdrawing liquid from said second reservoir, said second reservoir including a dispensing nozzle area for receiving successive volumes of air introduced thereinto by said pump, and metering these volumes of air into said first reservoir to replace like volumes of liquid migrating from said first reservoir to said second reservoir for subsequent dispensing.

2. A liquid dispensing device as set forth in claim **1**, wherein said bottle includes a closable aperture for permitting manual refilling thereof with liquid.

3. A liquid dispensing device as set forth in claim **2**, wherein said aperture is in communication with said second reservoir.

4. A liquid dispensing device as set forth in claim **1**, further comprising a plurality of fillable, resealable bottles.

5. A liquid dispensing device as set forth in claim **1**, wherein said back plate includes a releasable locking mechanism that cooperates with said cover to releasably lock said cover to said back plate.

6. A liquid dispensing device as set forth in claim **5**, wherein said locking mechanism automatically locks said cover to said back plate upon attachment of said cover to said back plate.

7. A liquid dispensing device as set forth in claim **6**, wherein said locking mechanism includes a key for manually unlocking said locking mechanism.

8. A liquid dispensing device as set forth in claim **7**, wherein said key is convertible into a key that is removable from said back plate.

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